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CRUISE REPORT

VESSEL: *Hi`ialakai*, Cruise 04-01 (Fig. 1)
CRUISE

PERIOD: 13 September-17 October 2004

AREA OF OPERATION: Northwestern Hawaiian Islands

TYPE OF OPERATION: Personnel from the Coral Reef Ecosystem Division, Pacific Islands Fisheries Science Center, National Marine Fisheries Service (NMFS), NOAA, and the Northwestern Hawaiian Islands Ecosystem Reserve, National Ocean Service (NOS), NOAA conducted reef assessment/monitoring and mapping studies in waters surrounding the Northwestern Hawaiian Islands.

ITINERARY:

13-14 September — Start of cruise. Embarked Randy Kosaki (fish), Craig Musburger (fish), Darla White (fish), Greta Aeby (coral), Jean Kenyon (coral), Ranya Henson (invertebrates), Peter Vroom (algae), Erin Looney (algae), Joe Laughlin (towboard/fish), Brian Zgliczynski (towboard/fish), Molly Timmers (towboard/habitat), Casey Wilkinson (towboard/habitat), Stephani Holzwarth (moorings/tow), Kyle Hogrefe (moorings/tow), Danny Merritt (moorings/tow), Elizabeth Keenan (moorings/tow), Scott Ferguson (QTC/TOAD/CTD), Susan Middleton (Educational), Dan Suthers (Terrestrial), David Liistcshwager, and June Firing (data management). Departed Snug Harbor at 0900 for small boat drills. Departed Oahu at 2000 en route to French Frigate Shoals to commence cruise.

15 September — Arrived at French Frigate Shoals in late afternoon. Conducted small boat launch and recovery and unconscious diver rescue.

16 September — Began work at French Frigate Shoals. Completed four tows on northern fore- and backreefs. Conducted three fish and benthic REA surveys in forereef and lagoonal areas on the northwestern

area of the atoll. Deployed new CREWS buoy anchor and CREWS buoy. No night operations.

17 September — Continued work at French Frigate Shoals. Completed four tows: three in the northern lagoon, one east backreef. Conducted three fish and benthic REA surveys in lagoonal areas northeast of Tern Island. Recovered two and deployed three STRs and completed five shallowwater CTDs. The educational team photographed organisms around La Perouse Pinnacle.

18 September — Continued work at French Frigate Shoals. Completed four tows along the northeastern forereef. Conducted two benthic REA surveys: one northern backreef and one lagoonal patch reef. Fish collections occurred at three lagoonal sites. The mooring team completed deployment of the CREWS buoy by securing shackles and placing settlement plates around the base, then completed seven shallowwater CTDs, two radiometer casts, and water was sampled at two sites (with a total of six samples at each site). The educational team spent the day on Tern Island photographing juvenile sea turtles. Night operations included three TOAD surveys and two deepwater CTDs.

19 September — Continued work at French Frigate Shoals. Completed five tows along the southeastern fore- and backreefs. Conducted three REA surveys: one southern forereef and two lagoonal patch reefs. The mooring team recovered and replaced one STR and recovered another STR that was unreachable on September 17. Two radiometer casts, three shallowwater CTDs, and one water sampling protocol were also completed. Departed for Gardner Pinnacles at 1800 and completed one deepwater CTD southeast of Gardner Pinnacles.

20 September — Arrived at Gardner Pinnacles. Completed two tows around the pinnacles, and three REA surveys at both ends and on the leeward side of the exposed rocks. The mooring team recovered and replaced one STR and conducted nine CTD casts. Water samples were collected at two sites. Departed for Maro Reef at 1800 conducting one deepwater CTD en route slightly southeast of Maro.

21 September — Arrived at Maro Reef and began scientific monitoring on the south side. Very murky conditions hampered some activities. Four towed-diver surveys were completed. REA teams conducted three surveys. The mooring team collected and

	replaced two STRS, completed two water samples, and eight shallowwater CTDs. Night operations occurred on the windward side of reef. Four TOAD surveys and two deepwater CTDs were completed.
22 September	Continued work at Maro Reef. Conducted three REA surveys at northern sites, although the normal benthic sampling regime was not possible at site R9 because of strong current. Four towed-diver surveys were completed, and the mooring team deployed a new CREWS buoy anchor and retrieved the old anchor and buoy. Eight shallowwater CTD casts were made and one water sampling station visited. Five TOAD surveys and two deepwater CTDs were completed.
23 September	Continued work at Maro Reef. Conducted three REA surveys at sites located toward the center of the reef. Four towed-diver surveys were completed in the central portion of the reef. The mooring team completed deployment of the new CREWS buoy and conducted three shallowwater CTD casts. Departed for Laysan Island at 1800 conducting one deep water CTD en route slightly southeast of the island.
24-25 September	Arrived at Laysan Island. Because of heavy swells, all three REA sites were located on the leeward and south sides of the island. Five towed-diver surveys were completed, The mooring team retrieved and replaced two STRs, retrieved and replaced an SST buoy, and completed eight shallowwater CTDs. Four TOAD surveys and one deepwater CTD were completed. Began transit to Pearl and Hermes Reef.
26 September	One deepwater CTD was completed southeast of the atoll during early morning hours. Arrived at Pearl and Hermes Reef. Completed five tows on eastern fore- and backreefs. Conducted three fish and benthic REA surveys in forereef, backreef, and lagoonal areas in the southeastern part of the atoll. Retrieved and replaced CREWS buoy and CREWS buoy anchor. Five TOAD surveys and two deepwater CTDs were completed.
27 September	Continued work at Pearl and Hermes Atoll. Completed five tows on northeastern side of atoll: three forereef and one backreef. Conducted three fish and benthic REA surveys in forereef, backreef, and lagoonal areas in the northern part of the atoll. The mooring team deployed an STR and coral settlement plates at the CREWS buoy and recovered and replaced an additional two STRs at northern areas of the atoll.

	Seventeen shallowwater CTDs, 3 radiometer casts, and 9 chlorophyll/water samples were completed. The educational team conducted one dive to photograph reef organisms. Night operations included six TOAD surveys and two deepwater CTDs, one of which was aborted after accidentally hitting bottom.
28 September	Continued work at Pearl and Hermes Atoll. The towed-diver team completed three tows on southern side of atoll, transferred 150 gallons of fuel from the Casitas, and made two fish collection dives. The benthic REA team completed three REA surveys in one forereef and two backreef areas on the southern part of the atoll. The fish REA team collected fish for DNA analyses. Both REA teams visited possible wrecks of the Pearl and Hermes during their surface intervals. The mooring team replaced 1 STR and deployed another, conducted 11 shallowwater CTDs, 3 radiometer casts, and 1 water sample. Night operations included five TOAD surveys and two deepwater CTDs.
29 September	Continued work at Pearl and Hermes Atoll. The towed-diver team completed five tows on the southwestern side of atoll: two on the forereef and three on the backreef. The REA teams completed three surveys in one forereef and two backreef areas on the southernwestern part of the atoll. The mooring team replaced 1 STR, conducted 10 shallowwater CTDs, 3 radiometer casts, and 1 water sample. Night operations included six TOAD surveys and two deepwater CTDs.
30 September	Continued work at Pearl and Hermes Atoll. A severe thunderstorm in the morning resulted in a small boat recall until after lunch, and scientific activities were reduced as a result. The towed-diver team completed three tows on the northwestern side of atoll: one on the forereef and two on the backreef. The benthic REA team completed two surveys in one forereef and one backreef area on the northernwestern part of the atoll, while the fish REA team collected fish for DNA analyses. The mooring team replaced one STR, conducted five shallowwater CTDs, one radiometer cast, and one water sample, and released back onto the reef fish that had been collected for the educational team. Completed six TOADs and departed for Midway Atoll.
1 October	Arrived at Midway Atoll. Poor weather somewhat impacted scientific activities. The towed-diver team completed five tows at various locations around the atoll: one on the forereef and

four on the backreef. The REA teams completed three surveys in lagoonal and northern backreef areas. The mooring team replaced one SST, installed larval coral settlement plates, replaced three STRs, and conducted two shallowwater CTD casts. No night operations occurred.

2 October — Continued work at Midway Atoll. The towed-diver team completed three tows along the west to southwest forereef. The REA teams completed two surveys: one western forereef and one southern backreef. The mooring team spent considerable time hunting for the ODP, and found it wedged upside down under an overhang in 90 ft of water. Attempts at recovery failed. An injured-diver drill occurred after lunch. No night operations occurred.

3 October — Continued work at Midway Atoll. The towed-diver team completed two tows along the east and southeast backreef. The REA teams completed one survey on a southeastern backreef, while the mooring team continued retrieval efforts on the ODP (again with no success). Night operations consisted of five TOAD surveys and two deepwater CTDs.

4 October — Continued work at Midway Atoll. The towed-diver team completed five dives: three forereefs on the east to southeast sides, one lagoonal reef, and one tow in the channel. The REA teams conducted surveys on three forereef sites on the south side of the atoll. The mooring team successfully retrieved the ODP, conducted 10 shallowwater CTDs, 6 radiometer casts, and 7 water samples. Night operations consisted of five TOAD surveys and two deepwater CTDs. Departed for Kure Atoll.

5 October — Arrived at Kure Atoll. The towed-diver team completed five backreef dives around the atoll. The REA teams conducted surveys on two forereef sites and one backreef site on the north/northwest side of the atoll. The mooring team successfully replaced the CREWS buoy and associated STR and deployed new coral settlement plates. One shallowwater CTD was also completed. Night operations included six TOAD surveys and two deepwater CTDs.

6 October — Continued work at Kure Atoll. The towed-diver team completed four forereef dives around the east and north sides of atoll. The REA teams conducted surveys on one forereef, one backreef, and one lagoonal site. The mooring team swapped two WTRs, completed seven shallowwater CTDs,

	five radiometer casts, and one water sample. Night operations included six TOAD surveys and two deepwater CTDs.
7-8 October	Continued work at Kure Atoll. The towed diver team completed four forereef dives. The REA teams conducted surveys on one forereef site and two backreef sites. The mooring team swapped 2 STRs, completed 19 shallowwater CTDs, 2 radiometer casts, and 2 water samples. One shallowwater CTD was also completed. Night operations included six TOAD surveys. Departed for Lisianski Island.
9 October	Arrived Lisianski Island. The REA teams completed three fish and benthic surveys. The towed diver team completed four tows around Lisianski Island, and the mooring team replaced a WTR and an STR, conducted nine shallowwater CTDs, three radiometer casts, and one water sample. Night operations consisted of six TOAD surveys and two deepwater CTDs.
10 October	Continued work at Lisianski Island. The REA teams completed three fish and benthic surveys. The towed-diver team completed three tows and one dive to collect fish. The mooring team swapped a WTR and an SST, installed new coral settlement plates around the SST anchor, and deployed one STR on the SST anchor. Night operations consisted of seven TOAD surveys and two deepwater CTDs.
11-13 October	Continued work at Lisianski Island. The REA teams completed three fish and benthic surveys. The towed diver team completed four tows. The mooring completed 19 shallowwater CTDs, 2 radiometer casts, and collected 2 water samples. No night operations. Began 2-day transit to Mokumanamana. Conducted a CTD calibration test en route.
14 October	Arrived at Mokumanamana and conducted six TOAD survey operations. Adverse weather conditions prevented small boat launches or diver surveys. Began transit to Nihoa.
15 October	Arrived Nihoa. Adverse weather conditions prevented small boat launches or diver surveys. Began transit to Honolulu.
16 October	Arrive in Honolulu.

Table 1: Cruise statistics for the Northwestern Hawaiian Islands.

CRUISE STATISTICS:

	FFS	Gardner Pinnacles	Maro Reef	Laysan Island	Pearl and Hermes Reef	Midway Atoll	Kure Atoll	Lisianski Island	Mokumanamana	Nihoa	**Totals**
Towed diver habitat/fish surveys	17	2	12	5	21	15	13	11	0	0	96
Fish rapid ecological assessments	9	3	9	3	9	9	9	9	0	0	60
Benthic rapid ecological assessments	11	3	9	3	14	9	9	9	0	0	67
Radiometer casts	4	0	0	0	9	4	5	5	0	0	27
Water sample stations	4	2	3	2	6	3	3	3	0	0	24
SST buoys deployed	0	0	0	1	0	1	0	1	0	0	3
SST buoys recovered	0	0	0	1	0	1	0	1	0	0	3
STR deployed	5	1	3	2	7	4	3	2	0	0	27
STR recovered	4	1	2	2	5	4	3	1	0	0	22
CREWS buoys deployed	1	0	1	0	1	0	1	0	0	0	4
CREWS buoys recovered	1	0	1	0	1	0	1	0	0	0	4
TOAD drop camera surveys	3	0	7	3	25	9	15	13	6	0	81
Deepwater CTDs	2	1	5	2	8	3	4	4	0	0	29
Shallowwater CTDs	15	9	19	8	44	12	27	28	0	0	162
scuba dives	143	32	90	34	167	104	94	120	0	0	784

MISSIONS AND RESULTS:

A. Established quantitative methods were used to estimate numerical abundance of fishes and fish species richness. This effort constitutes a second year of monitoring for temporal changes in the NWHI using consistent protocols. Sampling was stratified by three habitat types (forereef, backreef, lagoonal/patch reef). Where possible, three surveys in each habitat type were conducted on the leeward side of each island or atoll (French Frigate Shoals, Gardner Pinnacles, Maro Reef, Laysan Island, Lisianski Island/Neva Shoals, Pearl and Hermes Atoll, Midway Atoll, and Kure Atoll). See Appendix A for individual site descriptions.

1. Sixty historical stations throughout the NWHI were resurveyed for fishes by the three-diver fish REA team. Ocean conditions precluded the establishment of three new stations at Nihoa. Resurveying historical stations confirmed the continued presence of high standing biomass fish assemblages dominated by carangid (jack) and shark apex predators. Fish assemblages continued to be numerically dominated by medium-bodied herbivores (primarily acanthurids) and by large numbers of small-bodied planktivores (primarily pomacentrids, but also chaetodontids and anthiine basslets). Endemic Hawaiian species rarely encountered on shallow reefs in the main Hawaiian Islands (e.g. *Genicanthus personatus, Epinephelus quernus*) were regularly seen at the northern three atolls. Species representing faunal links to southern Japan, including *Centrypyge interrupta*, were observed at the northern three atolls but were not recorded during transects.

B. Conducted surveys to document the species composition, relative abundance, percent cover, size distribution, and general condition of the shallowwater corals at eight reef systems in the Northwestern Hawaiian Islands (Appendix B).

1. REA surveys were conducted at 67 sites between French Frigate Shoals and Kure Atoll. Of the 57 scleractinian species documented from the NWHI, 25 species were enumerated within belt transects. *Porites lobata* is a dominant coral at all eight reef locations visited, with *Pocillopora meandrina* or *Montipora capitata* each co-dominating at four of the eight reef locations. Second to *Porites lobata*, corals in the genus *Acropora* were the next most abundant taxon at the sites surveyed at French Frigate Shoals. Percent cover of live coral, as determined by the line-intercept method, varied from 1% at five sites distributed among atoll forereef, backreef, and patch reef habitats, to 82.4% on a patch reef site at Pearl &

Hermes Atoll. Although size distributions vary among the eight locations visited, the majority (75.3%) of coral colonies have a maximum diameter smaller than 20 cm.

2. A milder bleaching event than that documented from the NWHI in 2002 was in progress at numerous sites visited during 2004. Affected species were *Montipora patula, M. capitata, Porites evermanni, P. lobata, P. compressa, Pocillopora meandrina,* and *P. damicornis*. The incidences of bleaching varied among species at the eight locations surveyed, with *M. patula* the taxon most affected at Maro, Laysan, and Lisianski (68.8%, 35.5%, and 56.3% of colonies affected, respectively). At the three northern atolls, bleaching was lowest on the forereef and substantially higher in backreef and lagoon patch reef habitats; as in 2002 *M. capitata* and pocilloporids were the most frequently affected corals at these atolls. At Pearl & Hermes and at Midway Atolls, the proportion of bleached colonies in these taxa rivaled the proportions documented in 2002; however, the visual impression was not as dramatic because there was less live coral surviving from 2002 to bleach. Thick algal turf and macroalgae covered the dead skeletons of *M. capitata* at many backreef sites that experienced acute bleaching in 2002, and the shallow (3-4 ft) portion of a central lagoon patch reef at Kure that had been severely bleached in 2002 had also become overgrown with thick algal growth.

C. Used quantitative photoquadrat sampling method to collect species composition and baseline abundance data of reef algae at all 10 islands and atolls in the NWHI to compare with previously collected qualitative samples (Appendix C).

1. A total of 66 sites were visited (11 @ FFS, 3 @ GAR, 8 @ MAR, 3 @ LAY, 14 @ PHR, 9 @ MID, 9 @ KUR, 9 @ LIS). Quantitative analyses were successfully completed at 60 of these sites, producing 714 algal photoquadrats with accompanying field-ranked species lists and voucher specimens. Qualitative analyses occurred at 6 sites. Although turf algae was ubiquitous throughout the island chain, and macroalgal cover was high, especially in forereef areas where the green alga *Microdictyon setchellianum* predominated. At least 22 species of green, 34 species of red, and 9 species of brown macroalgae were observed at the 10 islands. Although species composition remained relatively similar across the island chain, brown algal species were considerably more prevalent in the 3 northwesternmost atolls than in other regions. While not as diverse as red algal genera, green algal genera (particularly *Microdictyon setchellianum* and species of *Halimeda*) composed the bulk of macroalgal biomass seen.

D. The non-coral marine invertebrate fauna of coral reefs represents a group of animals that are numerically dominant in their habitat and in some cases represent taxonomic groups that are represented only in the marine

environment. This group of organisms is surveyed and monitored for the purpose of identifying changes to reef communities. This is accomplished through procedures that quantify a set of target organisms and which also gradually build an inventory of species to document biodiversity. Macroinvertebrate surveys were conducted to record species composition and abundance at eight islands and atolls in the Northwestern Hawaiian Islands in order to establish baseline data to monitor non-coral invertebrate fauna of each reef system (Appendix D).

1. A total of 62 sites were visited between French Frigate Shoals and Kure Atoll. All 38 target taxa chosen for monitoring were observed across the island chain. Species data is preliminary at this point and involves non-coral species quantified from field observations, which represented six phyla. Despite the surveys being conducted in multiple habitats *Echinostrephus* was the dominant macroinvertebrate found at all islands. At the southern islands of French Frigate Shoals, Gardner, Maro, and Laysan the second most common invertebrate was *Arca* shells. While at the northern islands of Lisianski, Pearl and Hermes Reef, Midway and Kure *Echinometra* was the second most common invertebrate. Hermit and trapezid crabs were commonly found at sites that had an abundance of *Pocillopora* heads. Macroinvertebrates were a major component of the reefs at all islands except Maro and Lisianski.

E. Used benthic and fish towed-diver survey methods at NWHI to provide a general description of reef habitat, invertebrates, and reef fishes over a large spatial scale. The methods provided assessments and the foundation for monitoring large-scale disturbances and general distribution and abundance patterns of macro-invertebrates and reef fishes over 50 cm total length (Appendix E).

1. A total of 81 towed-diver surveys were conducted totaling approximately 184 km of habitat.

   Fish Observations:
   The giant trevally (*Caranx ignobilis)* was the most commonly observed fish larger than 50 cm Total Length (TL) at all islands/reefs. Surveys were conducted along multiple habitats and *C. ignobilis* dominated most of the surveys regardless of habitat. Preliminary quantitative results yielded low shark densities at all reef/island locations during the survey period. Other frequently observed large fishes were the spectacled parrotfish (*Chlorurus perspicillatus*) and the green jobfish (*Aprion virescens*).

   Benthic Observations:
   Spatial distribution seemed to have no effect on the incidence of coral appearing pale and white throughout the chain. *Pocillopora* dominated backreef zones and appeared to have a higher occurrence of bleaching

than other zones. Maro Reef and Neva Shoals (Lisianski) seemed to have a higher occurrence of corals appearing pale. A total of 165 crown-of-thorns starfish (COTS), *Acanthaster planci*, were recorded during this cruise, 126 of them sighted at Pearl and Hermes Reef.

F. The Oceanography Team deployed a variety of surface and subsurface oceanographic instruments and conducted near- and offshore oceanographic surveys and at French Frigate Shoals, Gardner Pinnacles, Maro Reef, Laysan Island, Pearl and Hermes Atoll, Midway Atoll, Kure Atoll, Lisainski Island / Neva Shoal, Mokumanamana (Necker) Island, and Nihoa Island. These activities were intended to quantify and assess the overall hydrographic environment in the NWHI (Appendix F).

1. Four Coral Reef Early Warning System (CREWS) buoys, 5 Sea Surface Temperature (SST) buoys, 2 Ocean Data Platforms (ODPs), 4 Wave and Tide Recorders (WTR)s, 27 Subsurface Temperature Recorders (STRs), 7 Recruitment Plate Arrays, and 1 Semipermeable Membrane Device were deployed throughout the Northwestern Hawaiian Archipelago. Except for the following instruments, all deployments were replacements of existing instrumentation to assure the continuity of data for the assessment of oceanographic conditions. Five of the 27 STRs represent new deployments on the anchors of all CREWS buoys and near a SST buoy to provide additional data to enable temperature profiling and further understanding of coral bleaching events. A sixth new STR was deployed to study a thermocline observed at the shelf break of the southern reef slope of Pearl and Hermes Atoll. The Semi-permeable Membrane Device is an addition to the standard oceanographic sampling scheme of CRED. It was installed in coordination with the USF&W staff on Tern Island to study the settlement of airborne pollutants into the marine environment. Refer to Appendix F for details concerning instrument function and a thorough instrumentation summary (Table 1).

2. Conductivity, Temperature and Depth (CTD) casts were conducted at 127 sites, radiometer casts were conducted at 27 sites, and water samples were collected at 29 sites throughout the Northwestern Hawaiian Archipelago. The radiometer casts were conducted concurrently with CTD casts, and the water samples were collected at CTD/radiometer sites so that radiometer casts are a subset of CTD casts and water sample sites are a subset of the CTD/radiometer cast sites. Seven water samples do not fall into the subset pattern since they were collected while the radiometer was malfunctioning. Refer to appendix F for details concerning instrument function, sample purpose, a thorough cast summary (Table 2) and a methodology summary (Protocol 1).

3. For the most part, the data collected by the oceanography team require extensive post-cruise processing and analysis not allowing for an immediate summary of findings. However, data from the STRs have been applicable to observations made on this cruise concerning coral bleaching. Jean Kenyon has documented the bleaching of certain corals from sites at French Frigate Shoals, Maro Reef, Laysan Island, Pearl and Hermes Atoll, Midway Atoll, Kure Atoll and Lisianski Island/Neva Shoals. The extent of this bleaching appears to have lessened in step with the decrease of average maximum temperature, demonstrated by graphed STR data, as the cruise has progressed northwest along the archipelago. For more information refer to the section of this report written by Jean Kenyon.

G. Goals for night operations during HI0401 included deployments of the Towed Optical Assessment Device (TOAD) to videotape portions of the seafloor and shipboard conductivity, temperature and depth (CTD) casts (Appendix G).

1. The TOAD was deployed 94 times during the cruise, resulting in 85 usable transects. Each tow was typically conducted, so the camera sled was on the bottom for 20 minutes. A total of 30 hours of videotape data were collected, resulting in a total of 73.8 km of bottom coverage. Depths ranged from 17 to 143 m, but tows were typically located on the bank tops in depths of 30 to 50 m.

2. A total of 34 shipboard CTD casts were conducted at stations near each of the primary work sites. Casts were taken at each of the 10 permanent CTD stations along the NWHI chain. Other casts were located around the work sites as time permitted. Where possible, data were collected to the windward and leeward of each island. All casts were lowered to 500 m except for Cast015, which hit bottom at 459 m. Water samples were taken during 24 casts and samples were processed to measure the chlorophyll-*a* content. A Turner Designs self-contained underwater fluorescence apparatus (SCUFA) was integrated with the ship's CTD sensor and collected data starting with Cast021.

H. Expedition activities were documented through photography and video, and described in daily journal articles posted to an expedition web site. Feature articles on special topics were also written. Notes and interviews have been gathered for future education/outreach activities. In total, 26 journal entries and 6 feature stories published, and about 4,638 digital photographs and over 5 hours of video and audiotape have been gathered.

SCIENTIFIC PERSONNEL:

Randall Kosaki, Ph.D., Co-Chief Scientist, Fish Team, NOS
Peter Vroom, Ph.D., Co-Chief Scientist, Benthic Team – Algae, UH-JIMAR, PIFSC-CRED
Erin Looney, Benthic Team – Algae, University of Georgia
Ranya Henson, Benthic Team – Invertebrates, Bishop Museum
Jean Kenyon, Ph.D., Benthic Team – Corals, UH-JIMAR, PIFSC-CRED
Greta Aeby, PhD, Benthic Team – Corals, Hawaii DLNR-DAR
Craig Musburger, Fish Team, UH Manoa
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Brian Zgliczynski, Towboard Team – Fish, NOAA-NMFS
Molly Timmers, Towboard Team – Habitat, UH-JIMAR, PIFSC-CRED
Joseph Laughlin, Towboard Team – Fish, UH-JIMAR, PIFSC-CRED
Casey Wilkinson, Towboard Team – Habitat, UH-JIMAR, PIFSC-CRED
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Daniel Merritt, Mooring Team, UH-JIMAR, PIFSC-CRED
Scott Ferguson, Towed Camera/Deep water CTDs, UH-JIMAR, PIFSC-CRED
Daniel Suthers, Educational Team, UH Manoa
Susan Middleton, Educational Team, National Geographic
David Liitschwager, Educational Team, National Geographic
June Firing, Data Manager, UH-JIMAR, PIFSC-CRED

DATA COLLECTED:

Digital images of diseased coral
Field notes on signs of coral bleaching or disease
Samples of diseased coral for histopathological analysis
Digital images from algal photoquadrats
Algal voucher specimens
Algal field notes of species diversity and relative abundance
Digital images of the benthic habitat from towboard surveys
Macro-Invertebrate counts from towboard surveys
Quantitative surveys of reef fishes (larger than 50 cm TL) to species level from towboards
Habitat lineation from towboard surveys
Benthic composition estimations from towboard surveys
Videos of the seafloor from TOAD operations
QTC (benthic acoustic signature) data
Acoustic doppler current profiler (ADCP) transects
Conductivity, temperature, and depth (CTD) profiles to 500 m

(/s/Peter S. Vroom)
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(/s/Michael Seki) for
Approved by: _____
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Attachments

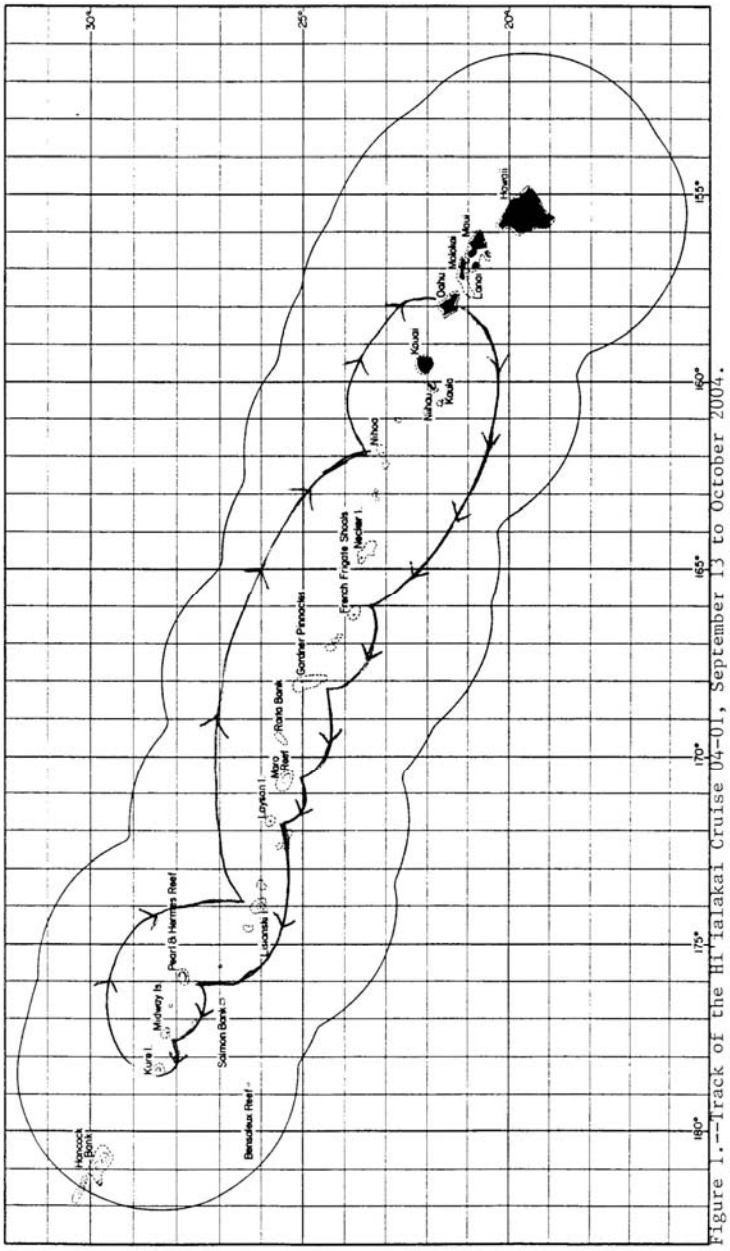

Figure 1.--Track of the Hi'ialakai Cruise 04-01, September 13 to October 2004.